Molecular Sensing with Graphene Foam Electrodes

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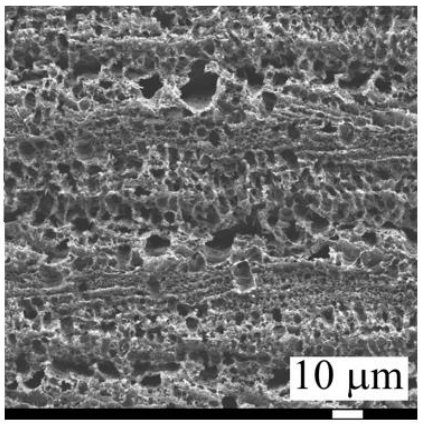
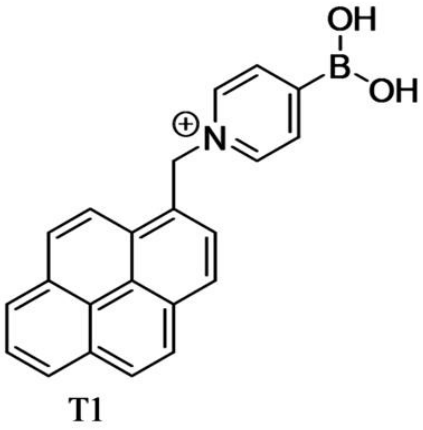
Graphene foam electrodes provide high surface area and low-cost film electrodes for sensing. Recently, new approaches based on boronic acids adsorbed to the graphene foam surface (see Figure [1,2]) have been reported. The sensing mechanism can be either based on current or based on capacitance. Binding the boronic acid "T1" onto graphene foam produces an order of magnitude change in capacitance (linked to quantum capacitance [3]). Interaction of the boronic acid in T1 can produce further capacitance signals. Therefore, sensing using capacitance (without the need for power) is feasible.





T1

In this study, graphene foam electrodes are investigated by voltammetry, impedance spectroscopy, microscopy, and molecular effects are modelled at molecular/electronic level with molecular dynamics and density functional theory. Examples of sensing applied to glucose are discussed.

Acknowledgments

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References

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